5   Attachment 5 – Work Plan

The following sections provide a detailed description of the Work Plan.

5.1   Scope of Work

This project proposes to construct three stream gauging sites, install water level transducers at four existing well sites, install one weather station in the watershed tributary to the Los Banos Creek Detention Reservoir, and modify a website to accept and display real-time information from each of the sites mentioned above (see **Exhibit 5.1**).   The project has been preliminary designed, however finalization of the design, environmental compliance, and permit acquisition have yet to be performed. Data regarding water quality, depth and flow rates will be collected on a regular basis after completion, to ensure all devices are working correctly.   Quarterly reports will be prepared throughout the contract period, followed by the Final Report document the achievements of the project.   The tasks and subtask necessary for successful implementation are described below.

5.2   Tasks and Subtasks

In an effort to better understand the parameters of the program and the magnitude of its effectiveness, implementation of the various monitoring and recording devices are necessary. The tasks laid out below demonstrate the path necessary for successful project completion and grant administration should the project be funded.

5.2.1   Task 1 – Design, Environmental and Permitting

5.2.1.1   *Subtask 1.1 – Design*

Civil design is only required on the stream gauging sites. The other improvements will be the installation of "out-of-the-box" devices provided by manufacturers based on their parameters. Design of the stream gauges will require some topographic surveys. This topographic data will be used to model the stream at different flow rates, to ensure that improvements do not impact the creeks operational capacity. Designs will then be prepared to construction level detail, for CCID staff to construct the gauges. In the same trip to survey the channel, surveys will also be performed to identify the reference elevation at each of the monitoring wells, and collect the location and elevation of the weather station.

5.2.1.2   *Subtask 1.2 – Environmental Compliance*

It is believed that the nature of the work is categorically exempt from CEQA requirements, and as appropriate, a Categorical Exemption (Class 6 'Information Collection – Section 15306 or Class 3 'Small New Facilities – Section 15303') for the work will be completed, adopted by the SJRECWA Board of Directors, and filed with the County. However, if it is determined that further environmental documentation is needed; the required CEQA documentation will be prepared by an appropriate environmental professional. Environmental issues regarding threatened and endangered species, potential mitigation measures, and other CEQA/NEPA requirements, for example cultural resources or air quality concerns, will be investigated. Provisions for fish and wildlife protection and discussion of environmental and ecological problems unique to this project will also be addressed. Once the improvements are selected, if appropriate an Initial Study for CEQA will be prepared to determine if an Environmental Impact Report or a Negative Declaration is the more appropriate CEQA document. This

will include an environmental assessment by a licensed wildlife biologist at each viable site and other technical studies as needed. Subsequent to the Initial Study, the appropriate environmental documents (EIR or Negative Declaration) may be recommended. If mitigation measures are identified as necessary, a Mitigation Monitoring and Reporting Plan will be completed. Additionally, the lead agency will complete the proper noticing requirements in accordance with CEQA Guidelines. SJRECWA's counsel will provide needed agreement documentation for right-of-way and entry permission for monitoring of wells.

5.2.1.3 Subtask 1.3 – Permits
The stream gauges will be impacting a natural stream, but for the most part will be placed in existing disturbed areas at canal and/or road crossings. Typically, this will require that a Department of Fish and Game Section 1602 Streambed Alteration Agreement. The standard notification form (FG2023) will be filed with DFG for the Streambed Alteration Agreement.

5.2.2 Task 2 – Construction and Implementation
Construction will be performed by CCID staff. CCID has a large crew that routinely performs construction throughout this District. This workforce increases when water is not being delivered, as ditchtenders transfer to maintenance and construction. In addition to construction crews, the District also has a SCADA technician capable of the installation of all the remote monitoring devices.

5.2.2.1 Subtask 2.1 – Construct Stream Gauges
Three locations have been identified as ideal locations for stream gauging, where Los Banos Creek crosses the follow facilities:

1. Delta Mendota Canal
2. CCID's Outside Canal
3. CCID's Main Canal

5.2.2.1.1 LBC at the Delta Mendota Canal

The first site will be located at the intersection of the Delta Mendota Canal (DMC) and the Los Banos Creek. Currently at this site exists 6 corrugated metal pipe arch culverts, roughly 6' tall by 10' wide (see plan, **Exhibit 5.2**). At this site it is proposed that a Sontek IQ-Plus (or equivalent) be installed in each of the culverts (see product literature, **Exhibit 5.3**). This will allow for flow measurement without having to disturb the existing channel or structure. The Sontek IQ-Plus uses acoustic Doppler flow measurement technology. These meters will be installed per the manufacturer recommendation. All of the flow meters will deliver their information to a solar powered Nexsens – iSIC Web Enabled Data logger (see product literature, **Exhibit 5.4**) in a cabinet located at the top of the channel bank adjacent to the culverts. This data will be transmitted back to the server and website via cellular communications. A staff gauge will be placed upstream for visual verification of flow rate.

Minimum construction will be required for this option. The first step will be locating and installing the mounting brackets for the flow meters. Next, conduits and pull boxes will be placed as necessary for the wiring to be routed the data logger adjacent to the culverts.

Figure 1. Site Photo of LBC Culverts near DMC

5.2.2.1.2 LBC at the CCID Outside Canal

The second site will be located at the intersection of Los Banos Creek with the CCID Outside Canal. A concrete lined control section will be constructed between existing concrete abutments at the site (see plan, **Exhibit 5.5**). This control section will be rectangular in shape, roughly 10-feet wide and 100-feet long.   A weir plate will be installed on the upstream end of the concrete lined section, stretching the width of the section.   This will act as a flow measurement device. Real time data will be collected by using a level transducer located in a stilling well upstream of the weir plate. The depth measured by the transducer will be relayed to the website via a solar powered YSI – EcoNet Web Enabled Data logger (see product literature, **Exhibit 5.7 and Exhibit 5.8**), and will then be translated into a flow rate, based on a head-discharge relationship.

Construction will begin with clearing and grubbing of all vegetative material within the limits of work. The ground will then be graded and compacted to a minimum of 90% relative compaction. Next, formwork and rebar will be constructed, and then the concrete will be poured into the forms and consolidated into place with by screeding. An 18" diameter stilling well will be installed adjacent to the creek, with a 4" diameter pipe connecting the stilling well to the channel. Finally the electronics (transducer and data logger package) will be installed to manufacturer recommendation, and integrated into the system.

Figure 2. Site Photo of LBC Crossing of CCID Outside Canal

5.2.2.1.3 LBC at the CCID Main Canal

The third site will be located at the intersection of Los Banos Creek with the CCID Main Canal. A trapezoidal concrete lined control section will be constructed upstream of an existing bridge at the site (see plan, **Exhibit 5.6**). This control section will be trapezoidal in shape, matching the existing channel width of about 40 feet and 10-feet long. A weir plate will be installed on the upstream end of the concrete lined section, stretching the width of the section. Vertical sidewall plates will be added to create a contracted rectangular weir to eliminate the effects of the trapezoidal shape and its inherent change in weir length with changes in depth. This weir will act as a flow measurement device. Real time data will be collected by using a level transducer located in a stilling well upstream of the weir plate. The depth measured by the transducer will be relayed to the website via a solar powered YSI – EcoNet Web Enabled Data logger (see product literature, **Exhibit 5.7 and Exhibit 5.8**), and will then be translated into a flow rate, based on a head-discharge relationship.

Construction will begin with clearing and grubbing of all vegetative material within the limits of work. The ground will then be graded and compacted to a minimum of 90% relative compaction. Next, formwork and rebar will be constructed, and then the concrete will be poured into the forms and consolidated into place with by screeding. An 18" diameter stilling well will be installed adjacent to the creek, with a 4" diameter pipe connecting the stilling well to the channel. Finally the electronics

(transducer and data logger package) will be installed to manufacturer recommendation, and integrated into the system.

Figure 3. Site Photo of LBC Crossing of CCID Main Canal

5.2.2.2 Subtask 2.2 – Install Monitoring Well Water Level Sensors

Transducers will be placed in 4 wells located in adjacent properties along the Los Banos Creek (site indicated by red circles on **Exhibit 5.1**). The complete setup will use a YSI – EcoNet Web Enabled Data loggers, with a YSI – 600LS Level Sonde water level transducers (see product literature, **Exhibit 5.7 and Exhibit 5.8**). The Level Sonde determines the depth of the water over the transducer, this is then relayed to the EcoNet which translates to a depth-to-water measurement, which will be transferred to the website via a cellular network. The installation instructions will be followed as provided by the manufacturer. YSI instructs the end-user to install the battery, connect the field cable, and lower to the appropriate depth. The EcoNet will be pole mounted near the well. CCID is aware of and will follow the electrical codes that are required for this type of installation.

5.2.2.3 Subtask 2.3 – Install Weather Station

In the watershed tributary to Los Banos Creek Detention Reservoir, a weather station will be installed for improved data to allow for improved reservoir operations. It is desired to install a Nexsens WS-100 total weather station (see product literature, **Exhibit 5.9**). This is equipped with a Vaisala WXT520 Multi-Parameter Weather sensor. This sensor is capable of measuring 6 different weather parameters: humidity, rainfall, temperature, barometric pressure, wind speed, and wind direction. Additionally, this weather station includes a data logger, cellular modem, and solar panel. The station will be in a representative area, free from turbulence caused by nearby objects, such as trees and buildings. At a minimum, on open area based on 150-meter radius from the weather station will be created. Since the device is battery powered, electrical service will not be required to be brought to the site.

5.2.2.4   *Subtask 2.4 – Website Modification*

Grassland Water District's website has room to accept and display the 8 proposed real-time data monitoring sites.   This website is maintained in-house by Grassland Water District. A link will be created on the home page labeled "LBCDR Real Time Monitoring". When directed to its page, a short description of the project will be provided along with a map displaying icons of the remote monitoring sites and their status (green- working, or red- not working). Each icon will be a link to each individual monitoring site's page that will display the real-time data. These links will not be password protect so that anyone interested in the operations has access to the information. Each of the SJRECWA Member agencies will also host links to this site.

5.2.3   Task 3 – Data Analysis and Reporting

5.2.3.1   *Subtask 3.1 – Perform Field Data Collection*

- **Water Quality -** Constituents of concern in the area are TDS, Nitrate, Arsenic, and Chromium VI. Each monitoring well site within network will be sampled and analytically tested for these constituents before and after a flow event through the creek (assumed quarterly). One blank sample and one duplicate sample will also be collected for quality control. Wells will be properly bailed to obtain representative water from the formation. Protocols exercised by the analytical laboratory will be followed as well (see sampling protocols, **Exhibit 8.1**). Water levels will also be recorded when water quality samples are retrieved. All sampling will be conducted by appropriate professionals, with appropriate preservatives, under proper chain of custody procedures, and transported to the lab within the proper holding times. The results will be summarized and reviewed by a water quality specialist. The results will also be compared to other water quality test results in the area, state drinking water standards, and recommended values for irrigated agriculture.

- **Monitoring Site Accuracy Verification –**
  It is proposed that the remote monitoring sites be evaluated on the schedule below. This schedule is subject to change depending on how sites perform.
  - **Well Sites -** on a monthly basis the depth to water in wells will be measured using a sounder. This measurement will be compared to the same reference point of the real-time data monitoring device, to ensure the devices are reporting reasonable values.
  - **Stream Gauges –** On a bi-weekly basis during stream flow events, a current meter will be used to compare flow rates obtained by the real-time monitoring devices. Where a rated section is used, the constants of the equation may need to be adjusted.
  - **Weather Station –** Site visits with a thermometer on a bi-weekly basis will be done to confirm the accuracy of the weather station. In addition, while not completely representative, internet sources will be consulted which can be effective in identify problems when large difference exist.

5.2.3.2   *Subtask 3.2 – Quarterly Report*

The Authority will submit required quarterly progress reports to DWR. These reports will discuss progress to date, data developed, information gained, costs incurred, and problems encountered. Each

report will be prepared in accordance with the required DWR format. Progress reports will also be provided to the Authority's Board of Directors.

5.2.3.3 *Subtask 3.3 – Final Reports*

The Final report will include pertinent data, criteria, maps, narratives, alternatives, recommendations, and conclusions identified in this work plan. The report will also include an Executive Summary, a comparison between the planned schedule in the Agreement, actual timeline of completed tasks, and an explanation of differences, and discussion of major problems encountered and how they were resolved. This report will also include data collected pursuant to this grant, including the following:

- Location and description of sites included in monitoring network
- Summary of stakeholder participation in this project
- Screen shots of website
- Water level information
- Water quality test results
- Hydraulic and hydrologic information

A draft report will be submitted to DWR for review. The agency review period is anticipated to be up to three months. The Draft Report will also be available in the SJRECWA office for review by the public. SJRECWA will submit copies of the Final Report to DWR in the quantities requested. The final report will address comments from DWR on the draft report. The Final Report will also be available in the SJRECWA office for public review.

5.3 Site Access

SJRECWA recognizes that acquiring access to property in a timely manner is critical to a timely completion of the project. The applicant will initiate obtaining permission for access to property early in the project stages, utilizing a Right-of-Entry form (see **Exhibit 5.10**). Time for obtaining property access is included as Subtask 1.3 in the project work plan, and allotted in the schedule.

5.4 Performance of the Project

Project monitoring will be performed through the following:

1. Updates on the project status at monthly Authority Board meetings
2. Updates on the project status at annual grower's meetings
3. Quarterly progress reports submitted to DWR
4. Meetings with other water agencies to discuss project impacts to third-parties
5. Submitting groundwater level and quality data to DWR and USBR
6. The Draft Project Report will be available in the Authority office for public review and comments

These monitoring efforts will provide opportunities for the public, Authority staff, neighboring agencies, and DWR to comment on the project. Involvement of these parties will ensure that the work is proceeding in the appropriate direction and ultimately provides a product that is needed and understood.

Lastly, the QA/QC measures outlined in **Attachment 8**: Quality Assurance will also help to ensure that the project is properly monitored and reviewed.

5.5 Information Dissemination

The goals of information dissemination for the Project include the following:

1. Educate public on the technical aspects of the project;
2. Educate public on available options for groundwater management;
3. Update public on progress;
4. Gauge public support; and
5. Collect and discuss comments and suggestions.

Information dissemination will be accomplished through the following methods, which the Authority already performs, and therefore will not add any extra burden:

1. Monthly public board meetings.
2. Updates about the proposed project will be published in the Authority quarterly newsletter over the life of the project.
3. Presentation and discussion of the project at the Annual Grower's Meeting.
4. Meetings with other agencies such as the San Luis Delta Mendota Water Authority.
5. The Draft Project Report will be available in the District office for the public to review.
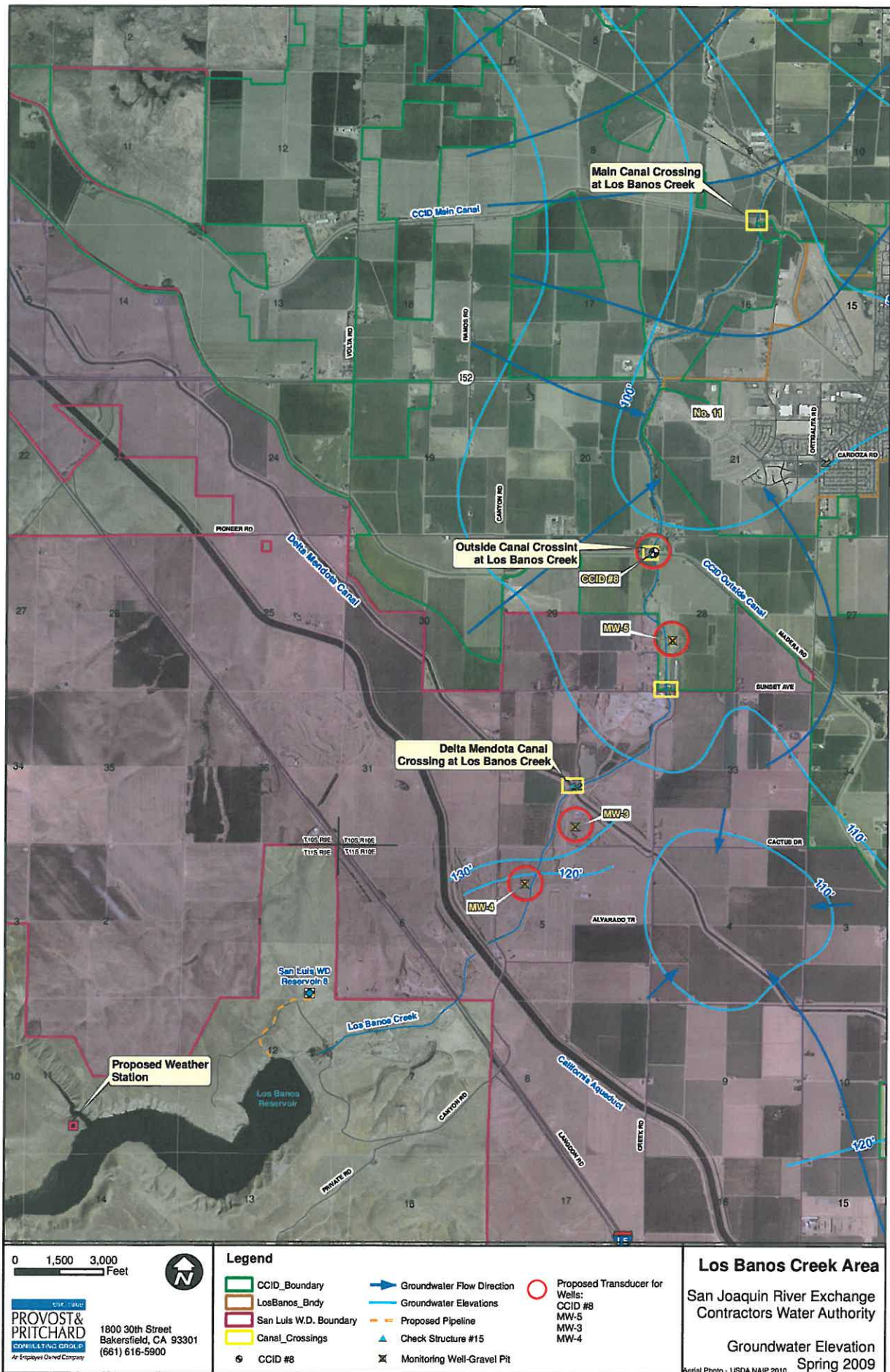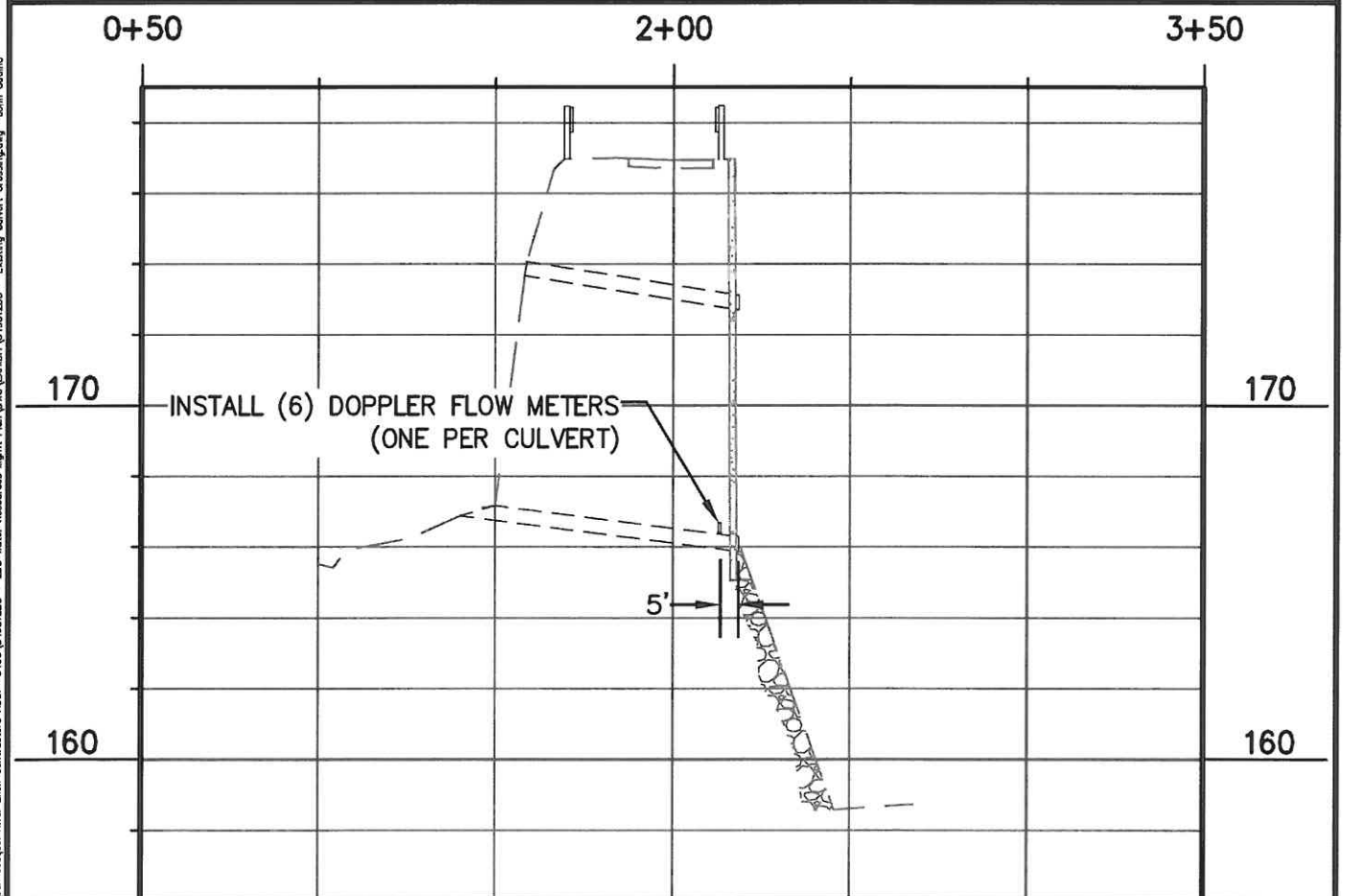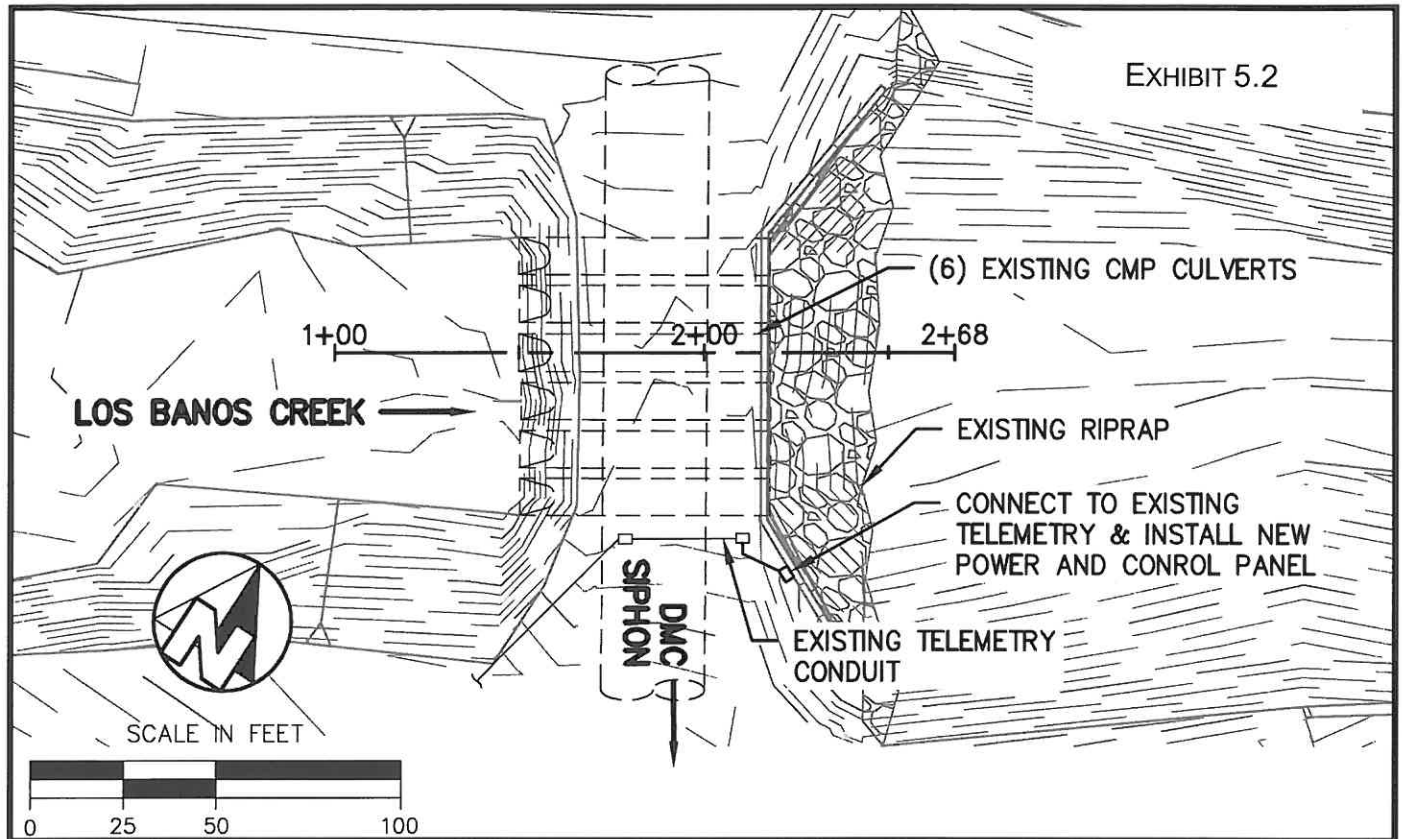
EXHIBIT 5.1

Main Canal Crossing at Los Banos Creek

CCID Main Canal

Outside Canal Crossint at Los Banos Creek

CCID #8

MW-5

Delta Mendota Canal Crossing at Los Banos Creek

MW-3

MW-4

San Luis WD Reservoir 8

Los Banos Creek

Proposed Weather Station

Los Banos Reservoir

Delta Mendota Canal

CCID Outside Canal

California Aqueduct

No. 11

Legend

0 1,500 3,000 Feet				

CCID_Boundary — Groundwater Flow Direction — Proposed Transducer for Wells: CCID #8, MW-5, MW-3, MW-4

LosBanos_Bndy — Groundwater Elevations

San Luis W.D. Boundary — Proposed Pipeline

Canal_Crossings — Check Structure #15

CCID #8 — Monitoring Well-Gravel Pit

PROVOST & PRITCHARD
CONSULTING GROUP
An Employee Owned Company
1800 30th Street
Bakersfield, CA 93301
(661) 616-5900

Los Banos Creek Area

San Joaquin River Exchange Contractors Water Authority

Groundwater Elevation Spring 2009

Aerial Photo - USDA NAIP 2010

W:\Clients\San Joaquin River Exch Contractors Auth -3495\349512B2 - LGA Grant\GIS\Map\Los Banos Creek-Proposed Transducers-2012-0711mxd.mxd

EXHIBIT 5.2

(6) EXISTING CMP CULVERTS

1+00   2+00   2+68

LOS BANOS CREEK →

EXISTING RIPRAP

CONNECT TO EXISTING
TELEMETRY & INSTALL NEW
POWER AND CONROL PANEL

DMC
SIPHON

EXISTING TELEMETRY
CONDUIT

SCALE IN FEET

0   25   50   100

0+50   2+00   3+50

170   170

INSTALL (6) DOPPLER FLOW METERS
(ONE PER CULVERT)

5'

160   160

EST. 1968
PROVOST&
PRITCHARD
CONSULTING GROUP
An Employee Owned Company

LOS BANOS CREEK AT DELTA MENDOTA CANAL
SAN JOAQUIN RIVER EXCHANGE
CONTRACTORS WATER AUTHORITY
MERCED COUNTY

EXISTING CULVERT CROSSING IMPROVEMENTS

DESIGN ENGINEER:
ROBERT STODDARD

DATE: 07/10/2012

JOB NO: 349512B3

SHEET 1 OF 1

EXHIBIT 5.3

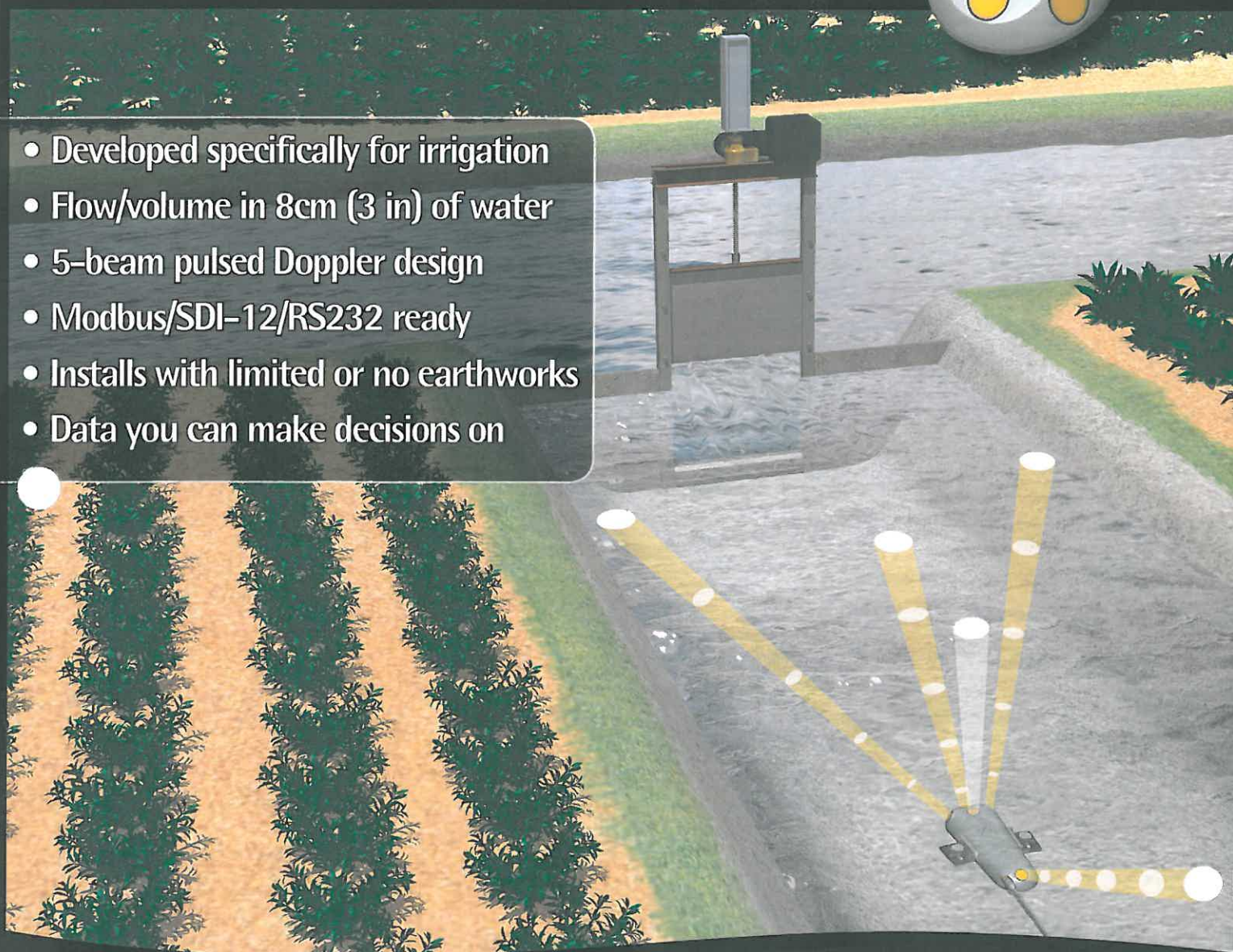[Preliminary - Do Not Distribute]

SONTEK

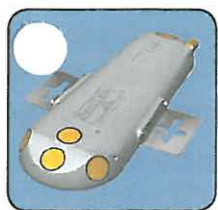# SonTek-IQ™

Volume • Flow • Level • Velocity

- Developed specifically for irrigation
- Flow/volume in 8cm (3 in) of water
- 5-beam pulsed Doppler design
- Modbus/SDI-12/RS232 ready
- Installs with limited or no earthworks
- Data you can make decisions on

SonTek
YSI incorporated

## Easy Set-up and Installation!

sontek.com

SonTek-IQ™

Developed with assistance from the Cooperative State Research, Education, and Extension Service of the U.S. Department of Agriculture*, the IQ starts with a custom flow algorithm derived from hundreds of field measurements. The four velocity beams profile water velocity both vertically and horizontally ensuring complete coverage of the velocity field. The built-in pressure sensor and vertical acoustic beam work in tandem to measure the water level. Simply input the channel geometry using the intuitive IQ software and you are outputting flow data in minutes.

Easy Installation: User friendly mounting brackets allow for the IQ to be installed by simply inserting two bolts 12.7 cm (5 in) apart along the centerline of the channel. The orientation of the slots on the mounting plate to allow users to orient the instrument in the direction of flow. Ultra-low power consumption allows for smaller solar panels and batteries – making monitoring less conspicuous.

Simple Integration: Stand alone monitoring? Use a Datalogger? How about an RTU? The SonTek-IQ supports communications via RS232, SDI-12 and Modbus. Simply connect your IQ and program your datalogger and you are ready to collect data – no clumsy converters – makes integrating the SonTek-IQ fast and simple. The SonTek Flow Display, with options for 4-20 mA outputs, integrates to everyday workflow, simply connect to the Tek-IQ and read flow read data in the field without connecting to ptop.
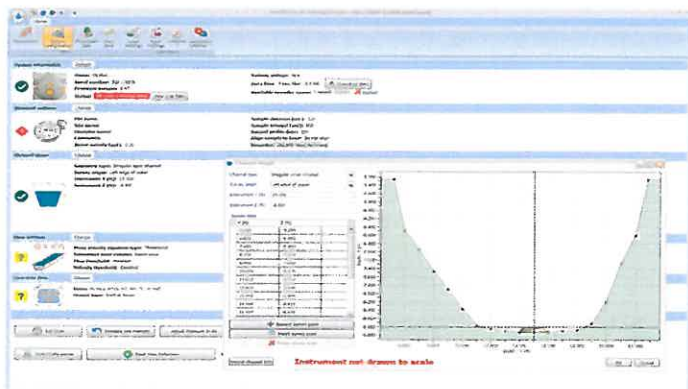
Example screenshot of the IQ SmartPage

- Self contained all-in-one design
- Proprietary flow algorithms for small irrigation canals
- Uses SonTek's exclusive SmartPulse[HD] adaptive sampling
- Self-calibrating water level using vertical beam and pressure
- Standard package includes, IQ Software, easy mounting hardware, cable, adaptor and power supply

SonTek/YSI
9940 Summers Ridge Road
San Diego, CA 92121, USA
Tel: +1 (858) 546-8327
Fax: +1 (858) 546-8150
Email: inquiry@sontek.com

SPECIFICATIONS
SonTek-IQ

Velocity Measurement	
-Sampling Range[1]	0.08 – 1.5 m (0.3 - 5 ft)
-Number of Cells	1 (dynamic integrated cell)
-Velocity Range	±5 m/s (16 ft/s)
-Resolution	0.0001 m/s (0.0003 ft/s)
-Accuracy	±1% of measured velocity, ±0.5 cm/s (0.2 in)
Water Level	
-Vertical Beam Range	0.05 – 1.5 m (0.2 - 5 ft)
-Pressure Sensor Range	10 m (33 ft)
-Pressure Sensor Accuracy	0.1% of full scale
-Water Level Accuracy	0.1% of measured depth or ±0.003 m whichever is greater (0.01 ft)
Power	
-Input	7-15 VDC
-Consumption[2]	0.5 – 1.0 W (0.02 when idle)
Acoustics	
-Acoustic Frequency	3.0 MHz
-(2) Along Axis Beams	25° off vertical axis, along axis of channel
-(2) Skew Beams[3]	60° off vertical and 60° off center axis of channel
Communications	RS232, SDI-12, Modbus
Data Storage[4]	4 GB (approximately 1 year)
Operating/Storage Temperature	-5 to 60° C (23 - 140° F)
Temperature Sensor	✓
Tilt Sensor	✓

SonTek-IQ Plus (All items listed above PLUS these upgrades)

Velocity Measurement	
-Sampling Range[1]	0.08 – 5.0 m (0.3 - 16 ft)
-Number of Cells	Up to 100
-Cell Size	2 cm – 10 cm (0.8 - 4 in)
Vertical Beam Range	0.05 – 5.0 m (0.2 - 16 ft)
Advanced Data Reprocessing	✓
Increased Number of Data Fields	✓

1 Reference from the bottom of the instrument, actual performance depends on environmental conditions
2 Depends on sample duration and sample interval, a typical deployment an sample duration of 2 minutes with a 15 minute sample interval consumes approximately 0.1 W on average.
3 Depending on site conditions, the skew beams allow for horizontal velocity profiling 3 times the measured depth.
4 Exact duration of data storage depends on instrument deployment; time estimate presented here is based on a typical deployment.

EXHIBIT 5.4

iSIC

- **8 analog & 4 digital sensor inputs**
- **Rugged NEMA 4X fiberglass enclosure**
- **Cabled & wireless telemetry options**
- **Internal battery with AC & solar options**
- **Built-in drivers for environmental sensors**

The NexSens **iSIC** (Intelligent Sensor Interface & Control) is the latest in data logging technology. Specifically designed for remote environmental monitoring applications, the **iSIC** offers superior data acquisition performance in extreme conditions. NexSens customers expect reliability, and the **iSIC** data logger delivers unmatched sensor interface and data collection with options for landline phone, cellular, radio, Ethernet, WI-FI, and satellite telemetry. Each **iSIC** data logger simultaneously supports 8 analog inputs & 4 digital inputs for multi-sensor data logging capability.

NexSens **iChart** Software is a Windows-based program for interfacing both locally (direct-connect) and remotely (through telemetry) to an **iSIC** data logger or network of data loggers. The **iChart** Setup Device Wizard includes built-in drivers and a step-by-step interface for setting up and configuring remote monitoring sensors and systems. When connected, the user can quickly configure sample & log intervals, upload data, or troubleshoot communications.

The **iSIC** data logger arrives ready for long-term deployment. All electronics are housed in a rugged, NEMA 4X enclosure constructed of heavy-duty fiberglass. The built-in 8.5 amp-hour sealed lead acid battery provides 12 volt power to the system, and the battery can be continuously charged using AC or solar power. Polymer-coated circuit boards, sealed connectors, corrosion-resistant stainless steel hardware, and built-in lightning protection ensure reliable performance in the harshest conditions. All sensors are cabled through Sealcon gland fittings to ensure protection from the elements.
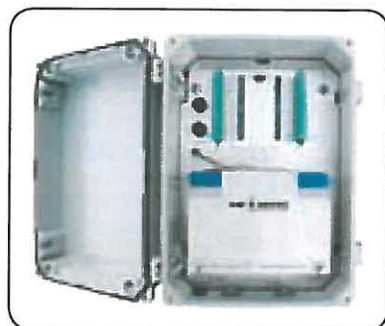
NEXSENS
technology

iSIC

specifications

Analog Inputs	(4) differential or (8) single-ended, additional (4) differential or (8) single-ended optional, 0-2.5 V auto range, 12-bit resolution
Analog Outputs	(1) 12-bit channel, (1) 12-bit channel optional, 0-5 V or 0-2.5 V programmable
Power Outputs	(1) 12 V 100 mA configurable switch, (1) 5 V 50 mA analog excitation voltage, (1) 12 V output, fused from battery
Pulse Counters	(1) tipping bucket counter, max rate: 12 Hz
Digital I/O Ports	(2) standard generic I/O ports
1-Wire Interface	(1) 1-wire temperature sensor port
SDI-12 Interface	(1) SDI-12 port
RS-232 Interface	(3) RS-232 sensor ports, (3) additional optional
RS-485 Interface	(1) RS-485 port
Host Interface	(1) RS-232 host port, SDI-12 or RS-485 port can be configured as slave
Supported Serial Comm Protocols	NMEA 0183 or Modbus RTU
Internal Memory	2 MB Flash memory, over 500,000 data points minimum
Power Requirements	Voltage: 5 to 16 VDC
Typical Current Draw	5 mA sleep, 10 mA processing, 36 mA analog measurement
Battery	12 V 8.5 A-Hr battery, internal
Temperature Range	-20 to +60°C
Dimensions	NEMA 4X enclosure: 12" x 8.5" x 6.95"
Compatible Sensors	4-20 mA sensors, 0-2.5 V sensors, SDI-12 sensors, RS-232 sensors, RS-485 sensors, Modbus RTU sensors, NMEA 0183 sensors, 1-Wire temperature sensors, Thermistor sensors, Tipping bucket rain gauges
Contents	(1) iSIC data logger (1) NEMA 4x enclosure (1) MS2 connector for battery charging (1) MS8 connector for sensor connection (1) Grounding lug (2) Gland fittings (1) 8.5 Ahr battery (5) Desiccant packs (1) RS-232 direct-connect cable (4) 56 Ohm resistors for 4-20mA sensor connection

parts list

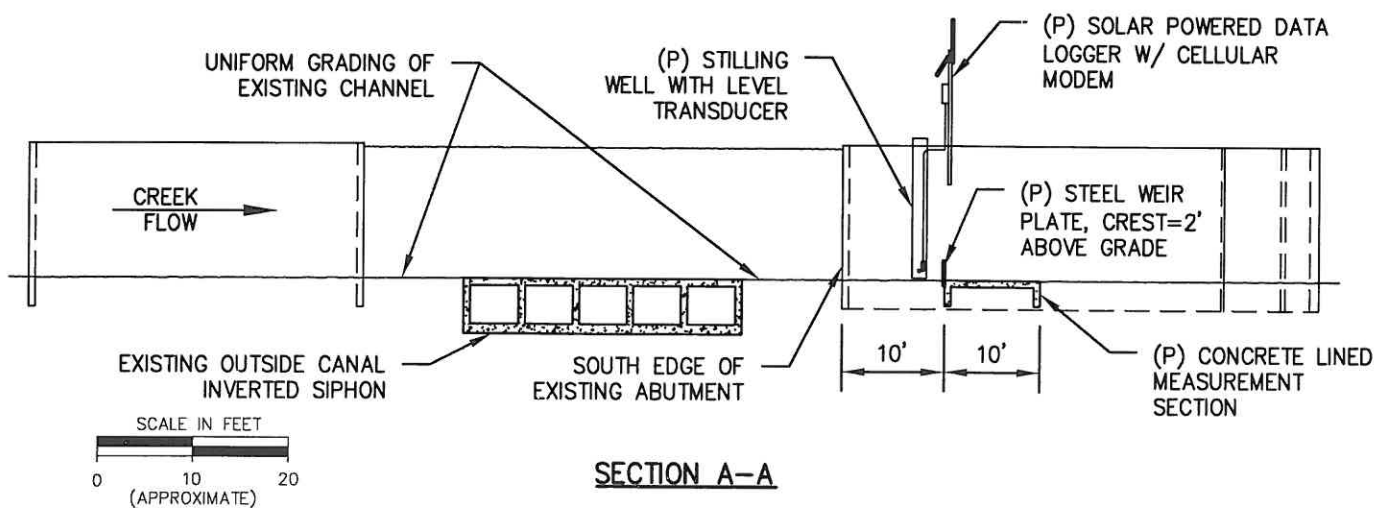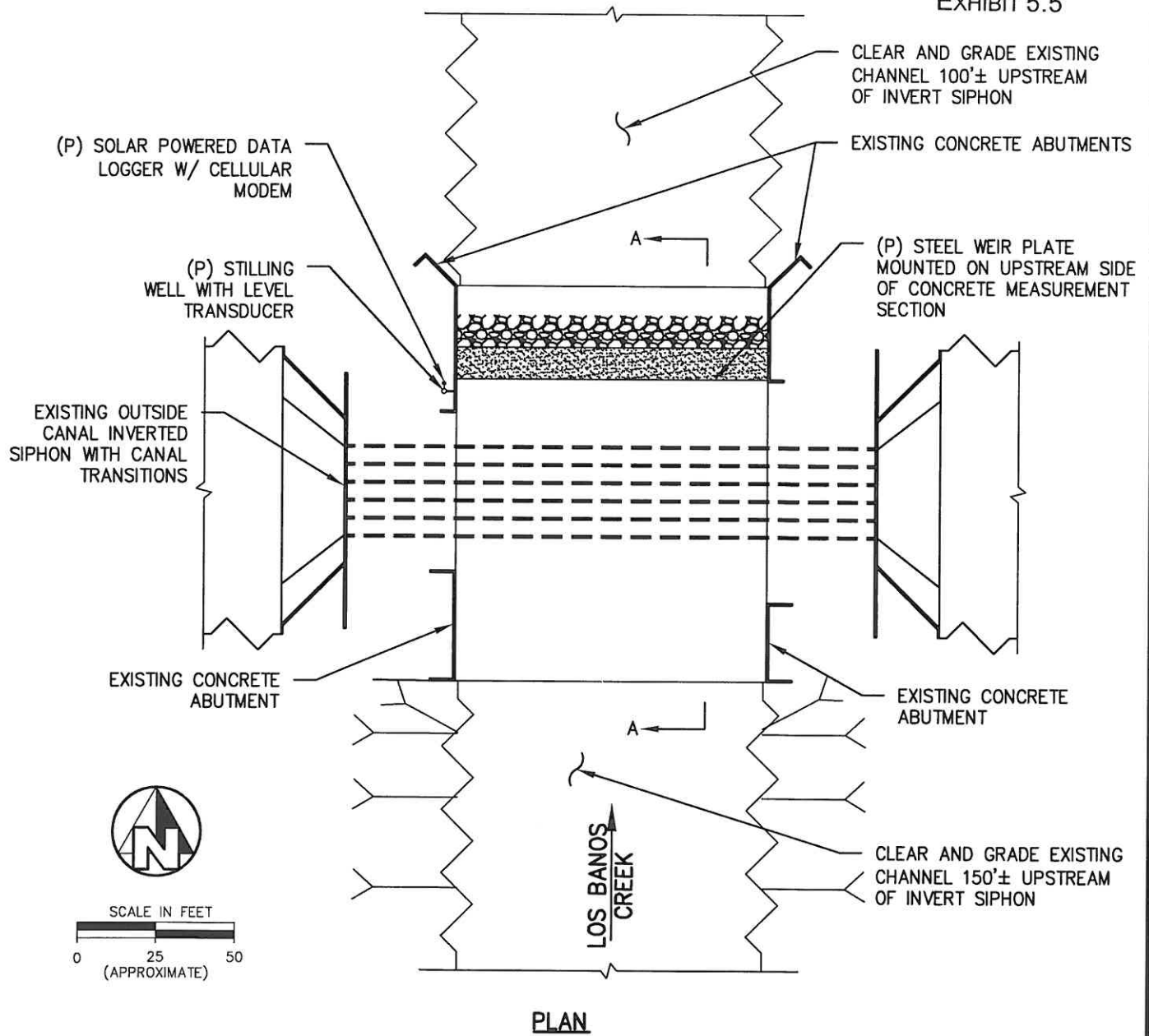| Part #	Description
iSIC	iSIC data logger
2100-iSIC	iSIC data logger with phone modem telemetry
3100-iSIC	iSIC data logger with cellular modem telemetry
3200-iSIC	iSIC data logger with radio-to-cellular telemetry
4100-iSIC	iSIC data logger with spread spectrum radio telemetry
4200-iSIC	iSIC data logger with radio-to-phone telemetry
5100-iSIC	iSIC data logger with Ethernet connectivity
5200-iSIC	iSIC data logger with radio-to-Ethernet telemetry
5500-iSIC	iSIC data logger with WI-FI connectivity
6100-iSIC	iSIC data logger with Iridium satellite telemetry
1001	iChart Software for Windows-based computers

NEXSENS technology
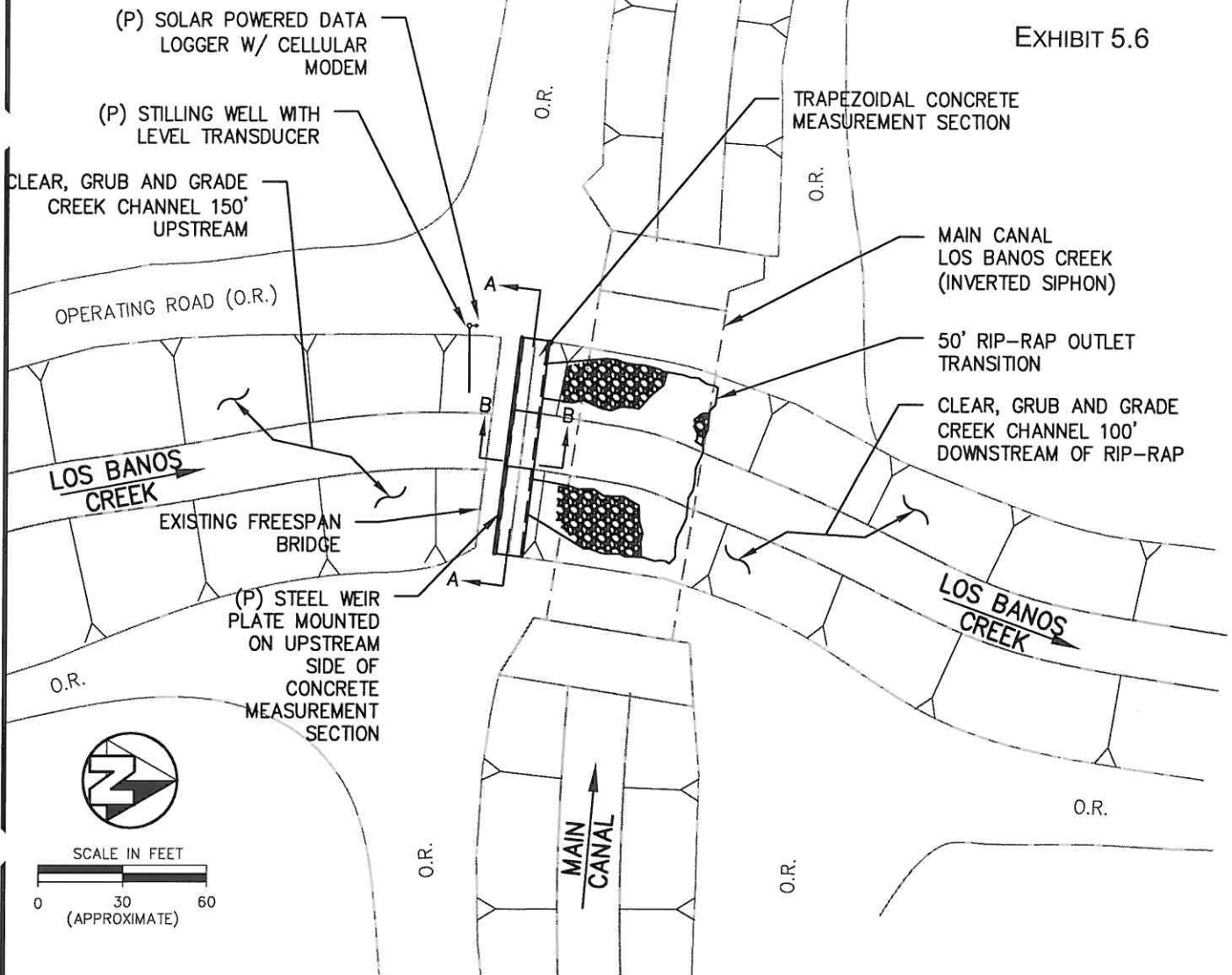
P **937.426.2703**
8am to 7pm EST, Monday-Friday

F **937.426.1125**
24 hours a day, every day

NexSens Technology, Inc.
PO Box 151
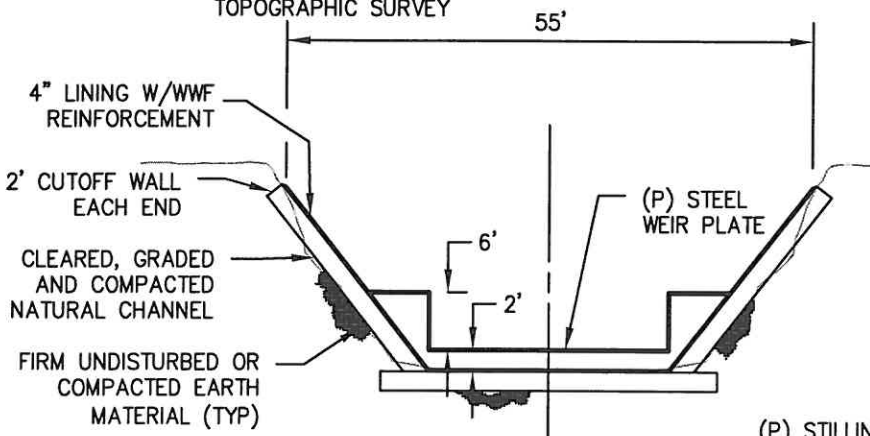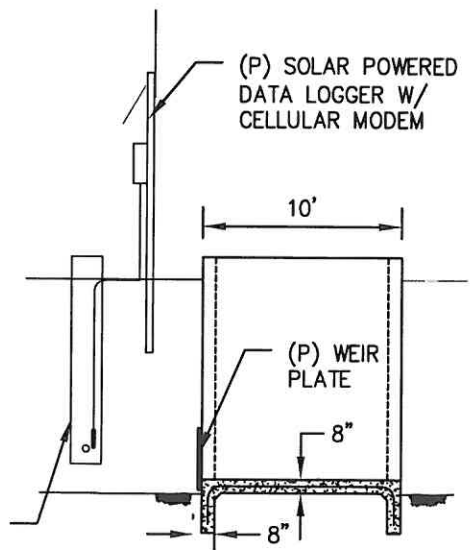Alpha, OH 45301-0151

E info@nexsens.com

→ nexsens.com

EXHIBIT 5.5

CLEAR AND GRADE EXISTING CHANNEL 100'± UPSTREAM OF INVERT SIPHON

EXISTING CONCRETE ABUTMENTS

(P) SOLAR POWERED DATA LOGGER W/ CELLULAR MODEM

(P) STEEL WEIR PLATE MOUNTED ON UPSTREAM SIDE OF CONCRETE MEASUREMENT SECTION

(P) STILLING WELL WITH LEVEL TRANSDUCER

A

EXISTING OUTSIDE CANAL INVERTED SIPHON WITH CANAL TRANSITIONS

EXISTING CONCRETE ABUTMENT

A

EXISTING CONCRETE ABUTMENT

LOS BANOS CREEK

CLEAR AND GRADE EXISTING CHANNEL 150'± UPSTREAM OF INVERT SIPHON

SCALE IN FEET
0   25   50
(APPROXIMATE)

PLAN

(P) SOLAR POWERED DATA LOGGER W/ CELLULAR MODEM

UNIFORM GRADING OF EXISTING CHANNEL

(P) STILLING WELL WITH LEVEL TRANSDUCER

(P) STEEL WEIR PLATE, CREST=2' ABOVE GRADE

CREEK FLOW

EXISTING OUTSIDE CANAL INVERTED SIPHON

SOUTH EDGE OF EXISTING ABUTMENT

10'   10'

(P) CONCRETE LINED MEASUREMENT SECTION

SCALE IN FEET
0   10   20
(APPROXIMATE)

SECTION A-A

OUTSIDE CANAL MEASURING SILL

DESIGN ENGINEER: R.M. STODDARD
DATE: 07/10/2012
JOB NO: 349512B3
SHEET 1 OF 1

EXHIBIT 5.6

PLAN

(P) SOLAR POWERED DATA LOGGER W/ CELLULAR MODEM

(P) STILLING WELL WITH LEVEL TRANSDUCER

CLEAR, GRUB AND GRADE CREEK CHANNEL 150' UPSTREAM

O.R.

O.R.

TRAPEZOIDAL CONCRETE MEASUREMENT SECTION

MAIN CANAL LOS BANOS CREEK (INVERTED SIPHON)

50' RIP-RAP OUTLET TRANSITION

CLEAR, GRUB AND GRADE CREEK CHANNEL 100' DOWNSTREAM OF RIP-RAP

OPERATING ROAD (O.R.)

LOS BANOS CREEK

EXISTING FREESPAN BRIDGE

(P) STEEL WEIR PLATE MOUNTED ON UPSTREAM SIDE OF CONCRETE MEASUREMENT SECTION

O.R.

A

B

B

A

LOS BANOS CREEK

O.R.

MAIN CANAL

O.R.

O.R.

SCALE IN FEET
0   30   60
(APPROXIMATE)

NOTE: CROSS SECTION DIMENSIONS MAY CHANGE BASED ON DETAILED TOPOGRAPHIC SURVEY

55'

4" LINING W/WWF REINFORCEMENT

2' CUTOFF WALL EACH END

CLEARED, GRADED AND COMPACTED NATURAL CHANNEL

FIRM UNDISTURBED OR COMPACTED EARTH MATERIAL (TYP)

(P) STEEL WEIR PLATE

6'

2'

SCALE IN FEET
0   10   20
(APPROXIMATE)

SECTION A-A

(P) SOLAR POWERED DATA LOGGER W/ CELLULAR MODEM

10'

(P) WEIR PLATE

8"

8"

(P) STILLING WELL WITH LEVEL TRANSDUCER

SECTION B-B
NOT TO SCALE

EST. 1968
PROVOST &
PRITCHARD
CONSULTING GROUP
An Employee Owned Company

MAIN CANAL MEASURING SILL

DESIGN ENGINEER:
R.M. STODDARD

DATE: 07/10/2012

JOB NO: 349512B3

SHEET   1   OF   1

EXHIBIT 5.7

YSI 600LS Level Sonde

Precise level measurement

The YSI 600LS compact sonde measures level, flow, temperature, and conductivity. The 600LS will seamlessly integrate with the YSI 650MDS, laptop, or data collection platform.

- Sonde fits down 2-inch wells
- Easily connects to data collection platforms such as the YSI 6200 DAS
- Detachable cable lengths
- Compatible with the YSI 650 Multiparameter Display System
- Temperature/conductivity/vented level
- Optional battery compartment for unattended, internal logging

With the 600LS, tide gauge measurements have never been so easy!

Ideal for use with the YSI 6200 DAS, connecting via SDI-12 for remote and real-time data acquisition applications. Rugged waterproof, the YSI 600LS is perfect for tide gauge monitoring, wetlands level applications, groundwater, estuaries, rivers, and more.

Features

The YSI 600LS is an economical logging system for long-term, in situ monitoring. It logs at programmable intervals and stores 150,000 readings. The 600LS has extreme level accuracy of ±0.01 feet (0.003 m) from 0 to 30 foot depths.

Pure Data for a Healthy Planet.®

Precise Level Measurement in a Compact Sonde

YSI Incorporated
Who's Minding
the Planet?

YSI 600LS Sensor Specifications

	Range	Resolution	Accuracy
Conductivity*	0 to 100 mS/cm	0.001 to 0.1 mS/cm (range dependent)	±0.5% of reading + 0.001 mS/cm
Salinity	0 to 70 ppt	0.01 ppt	±1% of reading or 0.1 ppt, whichever is greater
Temperature	-5 to +50°C	0.01°C	±0.15°C
Shallow Vented Level	0 to 30 ft, 9.1 m	0.001 ft, 0.001 m	±0.01 ft, 0.003 m

* Report outputs of specific conductance (conductivity corrected to 25° C), resistivity, and total dissolved solids are also provided. These values are automatically calculated from conductivity according to algorithms found in *Standard Methods for the Examination of Water and Wastewater* (ed 1989).

YSI 600LS Sonde Specifications

Medium	Fresh, sea or polluted water	Software	EcoWatch*
Temperature	-5 to +50°C	Dimensions Diameter Length (no batteries) Weight	1.65 in, 4.2 cm 15 in, 38 cm 1.10 lbs, 0.5 kg
Communications	RS-232, SDI-12	Power (optional)	4 AA-size alkaline batteries, or external 12 V DC

Ordering Information

| 600LS-10	Temperature, Shallow vented level
600LS-11	Temperature, Shallow vented level, Battery option
600LS-12	Temperature, Conductivity, Shallow vented level
600LS-13	Temperature, Conductivity, Shallow vented level, Battery option
Cables	
6195	10 ft vented detachable cable
6191	25 ft vented detachable cable
6192	50 ft vented detachable cable (Shallow vented level maximum depth is 30 feet.)

About Conductivity

The YSI 600LS is available with conductivity and without conductivity. In order to achieve the most accurate level measurements, it is highly recommended you use the **600LS-12** or **600LS-13** with conductivity if your application will require deployments in saline environments. Tidal, estuarine, salt water intrusion in groundwater, and freshwater/saltwater mixing zone studies are typical examples where a higher conductivity reading would require the conductivity sensor to achieve the most accurate, reliable level measurements.

As with all YSI products, there are several accessories available, from calibration solution to carrying cases, to keep your equipment protected and operating well. Please visit **www.ysi.com** or call **800-897-4151** for more information.

EXHIBIT 5.8

EcoNet® Web-Enabled Datalogger
Delivers data directly via web, email, or FTP
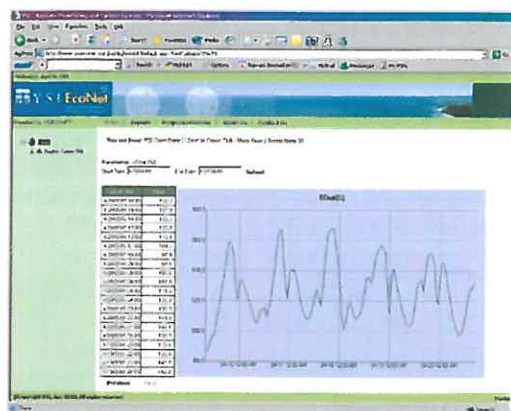
EcoNet is simple to operate, requires the least amount of maintenance of any real-time monitoring system, and makes collaboration easy. Because EcoNet can operate *without* a base-station computer, data is delivered from the field directly to a secure database web server. This allows limitless scalability—as many as 100 sites can transmit data simultaneously!

Set up is as simple as connecting the battery, antenna, and field cable. EcoNet does the rest—automatically detects the sensors, sets the units and sampling routine, and delivers data. You *do not* have to program code, interpret cryptic data files, join data sets to plot data, nor update software. Plus, you *do not* have to pay for desktop software licenses; only internet access is needed.

You can make changes through a web site from anywhere in the world. You can also rely on YSI's unrivaled technical team should you need advanced support.

Collaboration
- Web-based monitoring network is ideal for securely sharing data with strategic partners and co-operators.
- Dedicated public website can display provisional real-time data directly to the public, without the need for local IT resources

Integration
- YSI monitoring instrumentation works seamlessly with EcoNet
- Does *not* require a base station to relay the data
- Does *not* require a PC in the field to retrieve data and configure system
- EcoNet web sites can be customized with your logo, colors, and images

Information
- Turn data into information by visualizing sites on maps, plots, and gauges
- Tailor reports with information that users are specifically interested in
- Program alarms for visual display and email notifications
- Set up automatic emails for daily data reports

Services
YSI employs a team of field contractors and engineers who can help survey a site, select the best monitoring locations, install site infrastructure, and coordinate the start-up of your monitoring network. From a single site to hundreds, YSI has tools to get you running with a minimal amount of resources.

For applications <u>not</u> requiring data to the web, YSI EcoLink provides a easy to use interface with data delivery to a desktop computer.

YSI EcoNet®
Web-enabled Remote Monitoring and Control

www.ysi.com/econet
www.ysieconet.com

EcoNet Features

Data Management Services:
Hardened internet data center
Firewall and virus protection
Redundant power and connectivity

Data Display/Access:
Public web site access with URL
View data (tabular or graphical)
View historical data
Private secure access with password
Data display and analysis
Download data files (current/historical)

Site/Sensor Configuration:
User-selectable sensor/site sample interval
User-selectable transmission interval
 (from a configuration web site)

Data Reports:
Fixed time reports (daily, weekly, monthly)
User-defined reports

Alarm and Alert Set-up:
Create/edit local actions (control)
Create/edit alarm settings and threshholds
Initiate notification on alarm
Event triggers (alarm outputs, sampling rate, transmission rate)

Web Site Content Management:
Create and manage content
Configure data display
Add/edit map images and graphics
Create and manage users and roles

Data Sharing and Transfer:
FTP data transfer (weekly)
Data reports

YSI 6305-xx EcoNet Datalogger Specifications

Power		Main input voltage: 7.5 - 16 V DC
		 Rechargeable gel-cell battery, or lead acid (minimum recommended: 12 V, 18 Ah)
		 Typical current consumption:
		   Normal operation: 55-70 mA
		   Sleep mode: 12-15 mA

Memory		16 MB Flash, 32 MB SDRAM
Size	Length	8.75 in. (22.2 cm)
	Width	5.25 in. (13.3 cm) includes connectors
	Height	5.0 in. (12.7 cm)
LCD/Keypad (6305 only)		Alphanumeric LCD, 4 lines x 20 characters Numeric 4 x 4 keypad (0-9, *, #, A-D)
Ethernet		10 MB on-chip ethernet controller 10BASE-T port with analog filters

Input/Output	Analog	8 configurable 12 bit analog inputs
		 Input voltage: 0 - 2.4 V
		   Configurable as:
		     Single-ended (7 available channels + 1 internal battery monitor)
		     Differential (3 differential pairs)
		     4-20 mA loop (7 available channels)
		   Programmable gain: 0.5, 1, 2, 4, 8

	Digital	8 user-configurable digital I/O (24 channels optional)
		   Configurable as:
		     Input (5 V tolerant)
		     Output (max 3 mA)
		     Pulse input (accumulation available)
		 Digital port output high voltage: 0.8 to 3.1 V
		 Digital port output low voltage: 0.3 to 0.5 V
		 Digital port I/O capacitance: 8 pF

Comm Ports		1 RS-232 diagnostic port 1 SDI-12 serial port, supports up to 10 SDI-12 sensor devices at 1200 bps data rate

EXHIBIT 5.9

automatic weather station

WS-100

- **Measures six weather parameters**
- **No moving parts**
- **Solar charged with built-in battery**
- **Mounts to 2" NPT pipe adapter**
- **Standalone or cellular telemetry**

The **WS-100** weather station provides a complete sensor interface and data collection platform for measuring six of the most essential weather parameters. The system simultaneously measures wind speed & direction, liquid precipitation, barometric pressure, temperature, and relative humidity - all in a compact sensor housing with no moving parts. All measurements are based on proven Vaisala technology, such as the WINDCAP sensor for wind speed & direction, the modern RAINCAP sensor for rainfall & rain intensity, and a single module for barometric pressure, temperature, & humidity.

The complete weather station conveniently mounts to the included 2" threaded aluminum mast and is ready for long-term deployment. All electronics are housed in a rugged, NEMA 4X enclosure constructed of heavy-duty fiberglass. The built-in 8.5 amp-hour sealed lead acid battery provides 12 volt power to the system, and the battery is continuously charged via the 20-watt solar power kit. Polymer-coated circuit boards, sealed connectors, corrosion-resistant stainless steel hardware, and built-in lightning protection ensure reliable performance in the harshest conditions.

The **WS-100** standalone weather station consists of a NexSens **iSIC** Data Logger, Vaisala WXT520 multi-parameter weather sensor, 20-watt solar power kit, and a 2" threaded aluminum pole with mounting hardware. The WS-100C real-time cellular telemetry system also incorporates a built-in modem and high gain antenna. The real-time system can be configured for any of the major cellular networks, including Verizon, AT&T, or Sprint Nextel. NexSens **iChart** Software is a Windows-based program for interfacing both locally (direct-connect) and remotely (through telemetry) to a weather station or network of weather stations.

NEXSENS
technology

WS-100

specifications

Wind Speed Range	0-60 m/s
Wind Speed Accuracy	±0.3 m/s or ±3% at 0 to 35 m/s, whichever is greater; ±5% at 35 to 60 m/s
Wind Direction Azimuth	0-360°
Wind Direction Accuracy	±3°
Precipitation Collecting Area	60 cm²
Rainfall Accuracy	5%
Pressure Range	600-1100 hPA
Pressure Accuracy	±0.5 hPA at 0 to 30°C; ±1 hPA at -52 to +60°C
Humidity Range	0 to 100% RH
Humidity Accuracy	±3% RH at 0 to 90% RH; ±5% RH at 90 to 100% RH
Temperature Range	-52 to +60°C
Temperature Accuracy	±0.3°C (at 20°C)
Sensor Dimensions	9.4" Height x 4.7" Diameter
Internal Memory	2 MB Flash memory, over 500,000 data points minimum
Typical Current Draw	5 mA sleep, 10 mA processing, 36 mA analog measurement
Battery	12 V 8.5 A-Hr battery, internal
Additional Sensor Inputs	(8) analog, (3) digital
Operating Temperature	-20 to +60°C
Data Logger Dimensions	NEMA 4X enclosure: 12" x 8.5" x 6.95"
Cellular Modem Power Requirements	350 mA receive/transmit typical, 104 mA idle, power management available
Cellular Modem Frequency Range	GPRS: Dual band 800/1900 MHz; CDMA: Quad band 850/900/1800/1900 MHz
Cellular Modem Service Type	GPRS/EDGE/GSM,CDMA
Supported Cellular Providers	AT&T, Verizon, Sprint, Alltel

parts list

Part #	Description
WS-100	Standalone weather station
WS-100C	Automatic weather station
1001	iChart Software for Windows-based computers
212793	Bird spike kit
WSP150	Surge protector for Vaisala ultrasonic wind sensors
A38	Ground kit
A38-P	Ground kit, pipe attachment

NEXSENS technology

P 937.426.2703
8am to 7pm EST, Monday-Friday

F 937.426.1125
24 hours a day, every day

NexSens Technology, Inc.
PO Box 151
Alpha, OH 45301-0151

E info@nexsens.com

→ nexsens.com

EXHIBIT 5.10

San Joaquin River Exchange Contractors Water Authority
P.O. Box 2115
Los Banos, CA 93635
Telephone: (209) 827-8616

Well Owner _____
Address _____
City, State, zip _____
Telephone _____

Right-of-Entry Agreement
For The
Los Banos Creek Water Resources Management Plan
Los Banos Creek Groundwater and Surface Water Monitoring Program

I,_____, hereby grant permission to the San Joaquin River Exchange Contractors Water Authority, (Authority) and its officers, employees, agents (including member district staff), for ingress and egress with all necessary equipment on the following lands in the County of Merced, State of California:

Assessors Parcel Number_____   Well Number_____
Assessors Parcel Number_____   Well Number_____
Assessors Parcel Number_____   Well Number_____

This Right-of-Entry Agreement is for the purpose of measuring groundwater levels and/or groundwater quality as described in connection with the Los Banos Creek Groundwater and Surface Water Monitoring Program objectives, a summary of which is attached hereto. Such permission is subject to the following conditions.

1. In the performance of the above-referenced work, reasonable precautions shall be exercised by the Authority to avoid damage to persons or property. The Authority shall hold the Permitter harmless from any such damages caused by the negligence of the Authority or any of the other permittees named herein; provided, however, that the Authority shall not be responsible or liable to Permitter for the consequences of any act which was beyond the control of the Authority or the other permittees.

2. This permit shall be in full force and effect and shall continue until such time as it is terminated by either the Authority or the Permitter in writing.

Signatures:

By: _____
                    (Well Owner)

Date:_____

By:_____
(Executive Director, San Joaquin River Exchange Contractors Water Authority)

Date:_____